as with the weapon of combating the most fertile sources of infection. In preventing the distribution—either by proper disinfection, or by destruction—of the expectorations of tubercular persons, and further, in superintending and restricting the use of tubercular animals of the bovine species, we possess the means of preventing the spread of this deadly and terrible plague, and hereby saving a vast amount of human life. These discoveries of Dr. Koch were made entirely through experiments on living animals.

E. KLEIN

DEEP-SEA EXPLORATION

IN NATURE, vol. xviii. p. 348, we described Negretti and Zambra's Patent Deep-Sea Standard Thermometer. Some uncertainty as to the accuracy of its indications in deep sea service led to a re-arrangement of the instrument, which now greatly increases its reliability. The improvement is chiefly due to suggestions furnished by Commander Magraghi (see NATURE, vol. xxiv. p. 505)

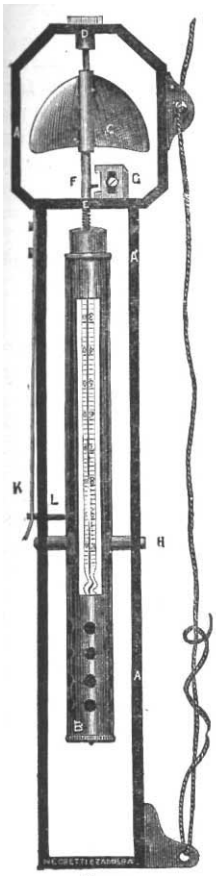

FIG. 1.

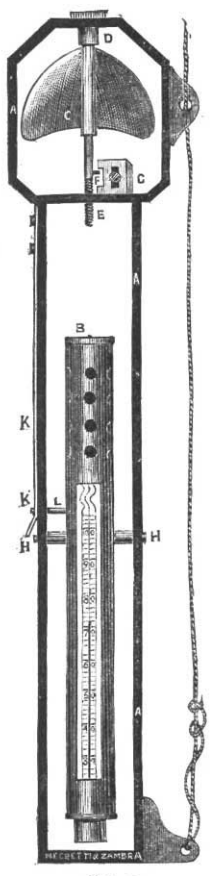

FIG. 2.

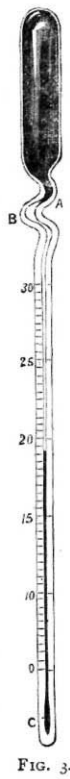

FIG. 3.

(of the Royal Italian Navy) to Negretti and Zambra. Several of these improved thermometers may now be fastened on one line, and serial temperatures at any required depth obtained with certainty.

The woodcuts exhibit the apparatus, Fig. 1, as prepared for lowering down into the Sea, and Fig. 2 after the hauling up has commenced—the thermometer having reversed and registered the temperature at the moment of turning over. Fig. 3 shows the peculiar construction of Negretti and Zambra's inverted thermometer used in their improved deep-sea apparatus. The apparatus will be understood by reference to figures (Nos. 1 and 2). A is a metal frame, in which B, the thermometer, is pivoted upon an axis, H, but not balanced upon it. C is a screw-fan attached to a spindle, one end of which works in a socket, D, and at the other end is a screw, E, about half an inch long, and just above it is a small pin, F. On the spindle G, is a sliding stop-piece, against which the pin, F, impinges when the thermometer is adjusted for use. The screw, E, works into the end of the case, B, the length of play to which it is adjusted. The number of turns of the screw entering the case is regulated by means of the pin, F, and stop-piece, G. The thermometer and its case is held in position by the screw, E, and descends into the sea in this position—as Fig. 1; the fan, C, not acting during the descent, because it is checked by the stop, F. When the ascent commences, the fan revolves, raises the screw, E, and releases the thermometer, which then turns over and registers the temperature at that spot. When the hauling-up has caused the thermometer to turn over, a spring at K forces the pin, L, into a slot in the case B, and clamps it (as seen in Fig. 2) until it is received on board, so that no change of position can occur during the ascent from any cause. The case, B, is cut open to expose the scale of the thermometer, and also perforated to allow free passage of the water.

SOME PRIMITIVE IDEAS ON METEOROLOGY

IN an article published in NATURE (vol. xxv. p. 82) on the opinions of the Chinese Emperor Khang-hi on certain natural phenomena, it will be remembered that the *yang* and *yin*, or the male and female principles of Chinese philosophy, played a conspicuous part. Japan, it is well known, adopted at a very early period in its history the law, polity, science, philosophy, and writing of the Chinese, and with them the *yang* and *yin;* and it may not be uninteresting to our readers to see how the doctrine of these dual forces, mutually repellent as well as attractive, has been employed to explain the facts of meteorology. A recent issue of the *Japan Gazette* newspaper of Yokohama contains the translation of a work written in 1821 by a certain Arai Yoshinari, called the "*Ten-chi-jii;* or, Ideas about Heaven and Earth." The heavens, the writer says, are very high, the earth is very thick; we cannot ascend to the one or go down into the other; consequently man was unable for many generations to comprehend the phenomena of either; but now the opinions of all philosophers on this subject are based on the action and reaction of the male and female, the active and passive principles of nature upon each other. The rain is a changed form of the male, and the vapour under the earth of the female principle. When the male principle sinks into the earth it pursues the female. The earth is the mother of all things and the heaven is the air or wind where the sun, the moon, and the stars hang shining. There are two kinds of air—the heaven-air and the earth-air. The motion of the heavens is contrary to that of running water. The heavens move from east to west, while water runs from west to east. In some districts, indeed, water in the earth runs towards the north, but meets the earth-air which obstructs its flow, causes much agitation, and finally its complete evaporation from the surface of the earth. The vapour thus formed ascends and becomes clouds, which are again turned into rain by the action of the wind. The water has periods of increase and decrease according to the male and female seasons; thus in summer, which is the male season, water increases, while in winter, or the female season, it diminishes. Again, the earth-air is changed into rain when it moves from east to west; and therefore, previous to rain, we see a white vapour in the morning ascending in the east. "This is a clear proof of the earth's growing hot." For the same reason mountains become somewhat darker just before rain.

Thunder is produced by the mingling of the male and female principles. Sounds are often heard in the earth in the neighbourhood of volcanoes. This is due to the

irritation of the earth-air, which sometimes sends out flames. It is said that a kind of beast accompanies the thunder, and it moves about in the air. This is nothing strange, because at a certain island called Ampon, which is about 3900 *ri* (1 *ri* = 2½ miles) from Japan, there is a bird called the *Kasubara*, which is covered with fur instead of feathers, and which eats fire. Other birds live on wind. As this world is unlimitedly great and extensive there may have lived strange beasts and birds, like the thunder beast which the Japanese talk about. The volume of sound given out by thunder depends on the number of water-clouds in the air. When the latter is small, the sound of the thunder is not loud and appears far off. On the other hand when the clouds are piled up in the heavens, the sound is loud and is simultaneous with the lightning. The sound is caused by the passage of fire through the water. The ancients regarded thunder as the report of the battle between fire and water—the male and female elements. If this were the case there is no reason for the interval between the flash and the sound. Earthquakes are subterranean thunder; the noise is caused by the rush of water which has long been kept confined by the earth-air. Snow is the vapour which rises from the earth; when it ascends high enough it becomes frozen and falls as snow. Fog is also this vapour. Haze is the vapour mixed with smoke from some volcano. The writer concludes by expressing his intention of making the actions of nature, such as rain, wind, &c.—difficult as they are to explain—quite clear on a future occasion.

These ideas may be taken as representing those of most educated Japanese of half a century ago, with the exception perhaps of a few who had been taught by the Dutch. What the Japanese peasant thought, and still thinks of thunder, earthquakes, storms, and other striking natural phenomena will be found in a deeply interesting chapter of Mr. Griffis's "Mikado's Empire." One of the principal Japanese artists, Hokusai, some of whose works have recently been given to the English public, did not think it beneath his genius to endeavour to picture the extraordinary creatures that form the zoological mythology of Japan. There the astonished student of Japanese pictorial art can behold Futen, the wind demon, Raiden, the creator of thunder, the fish whose movements cause earthquakes, the *kappa*, or demon of the deep, and dragons of sufficient variety of form to satisfy the weirdest imagination.

NOTES

RARELY has so distinguished and representative an assembly been seen in Westminster Abbey as that which met to pay the last honours to Mr. Darwin, on Wednesday last week. The Abbey indeed was crowded. The character of the long line of distinguished men who followed the honoured remains to the grave, may be seen from the list of pall-bearers:—The Duke of Devonshire, the Duke of Argyll, the Earl of Derby, Mr. J. Russell Lowell, the American Minister, Dr. W. Spottiswoode, P.R.S., Sir Joseph Hooker, Mr. A. R. Wallace, Prof. Huxley, Sir John Lubbock, and the Rev. Canon Farrar. Mr. Darwin has been buried close beside the grave of Sir John Herschel, and within two paces of that of Sir Isaac Newton. At the Royal Academy dinner on Saturday, Mr. Spottiswoode, in replying for science, could not but refer to the loss "of our greatest philosopher and noblest spirit." "I know not," he said, "whether, in the presence of statesmen and leaders of thought, of commanders both by sea and land, of artists, of preachers, of poets and men of letters of every kind, it is fitting that I should speak of greatness; but if patience and perseverance in good work, if a firm determination to turn neither to the right hand nor to the left, either for glory or for gain, if a continual overcoming of evil with good in any way constitute elements of greatness, then the man of whom I speak—Charles Darwin—was truly great. He lived, indeed, to a good age; he lived to complete the great work of his life; he lived to witness a revolution in public opinion on matters with which he was concerned such as few had seen before—a revolution from opposition to concurrence, a revolution from antipathy to sympathy, or whatever else may better express a complete change of front. And so having at the beginning been somewhat rudely pushed aside as an intruder and disturber of accepted opinions, he was in the end not only borne on the shoulders of his comrades to his last resting-place, but was welcomed at the threshold by the custodians of an ancient fabric and of an ancient faith as a fitting companion of Newton and of Herschel, and of the other great men who from time to time have been gathered there."

M. JAMIN, president of the Academy of Sciences, having summoned M. Quatrefages to deliver an *éloge* on the late Mr. Charles Darwin on Monday last, the eminent zoologist read a long and eloquent oration, which was received with unanimous plaudits, and will be printed in the next *Comptes Rendus*.

WE take the following from the *Times*:—The Council of the Royal Society have selected the following fifteen from the fifty-two candidates for the Fellowship who have presented themselves during the present session. The election, which rests with the Fellows of the Society, will take place on Thursday, June 8, at 4 p.m. The names are—Prof. V. Ball, Dr. G. S. Brady, Dr. G. Buchanan, C. Baron Clarke, Francis Darwin, Prof. W. Dittmar, Dr. W. H. Gaskell, Mr. R. T. Glazebrook, Mr. F. Ducane Godman, Mr. J. Hutchinson, Prof. A. Liversidge, Prof. I. Malet, Mr. W. D. Niven, Mr. R. H. Inglis Palgrave, and Mr. W. Weldon.

THE fifty-second Annual Meeting of the British Association for the Advancement of Science will commence in Southampton on Wednesday, Aug. 23. The President-Elect is C. W. Siemens, D.C.L., F.R.S. Vice-Presidents-Elect: The Right Hon. the Lord Mount-Temple, Capt. Sir F. J. Evans, K.C.B., F.R.S., Hydrographer to the Admiralty, F. A. Abel, C.B., F.R.S., Prof. de Chaumont, M.D., F.R.S., Col. A. C. Cooke, R.E., C.B., Director-General of the Ordnance Survey, Wyndham S. Portal, Prof. Prestwich, M.A., F.R.S., Philip Lutley Sclater, F.R.S. General Treasurer: Prof. A. W. Williamson, F.R.S., University College, London, W.C. General Secretaries: Capt. Douglas Galton, C.B., D.C.L., F.R.S., Francis Maitland Balfour, F.R.S. Secretary, Prof. T. G. Bonney, F.R.S. Local Secretaries: C. W. A. Jellicoe, John E. Le Feuvre, Morris Miles. Local Treasurer, J. Blount Thomas. The Sections are the following: A—Mathematical and Physical Science—President, Right Hon. Prof. Lord Rayleigh, F.R.S. Vice-Presidents: G. H. Darwin, F.R.S., Prof. G. C. Foster, F.R.S. Secretaries: W. M. Hicks, M.A., Prof. O. J. Lodge, D.Sc., D. McAlister, M.A., B.Sc. (Recorder), Rev. G. Richardson. B—Chemical Science—President, Prof. G. D. Liveing, F.R.S. Vice-Presidents: A. G. Vernon Harcourt, F.R.S., Prof. H. E. Roscoe, F.R.S. Secretaries: P. Phillips Bedson, D.Sc. (Recorder) H. B. Dixon, F.C.S., J. L. Notter. C—Geology—President, R. Etheridge, F.R.S. Vice-Presidents: Prof. T. Rupert Jones, F.R.S., Prof. J. Prestwich, F.R.S. Secretaries: T. W. Shore, F.G.S., W. Topley, F.G.S. (Recorder), E. Westlake, F.G.S., W. Whitaker, F.G.S. D—Biology—President, Prof. A. Gamgee, M.D., F.R.S. Vice-Presidents: Prof. W. Boyd Dawkins, F.R.S., G. E. Dobson, F.L.S., Prof. M. A. Lawson, F.L.S., Prof. J. D. Macdonald, F.R.S. Department of Anatomy and Physiology:—Prof. A. Gamgee, M.D., F.R.S. (President), will preside. Secretaries: W. Heape, A. Sedgwick, B.A. (Recorder). Department of Zoology and Botany:—Prof. M. A. Lawson, F.L.S. (Vice-President), will preside. Secretaries: W. A. Forbes, F.Z.S. (Re-